

Reverse Micelles. Biological and Technological Relevance of Amphiphilic Structures in Apolar Media

P. L. Luisi and B. E. Straub (Eds)
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The reversible association of amphiphiles in aqueous media to form micelles has been studied extensively since the early part of this century. Whilst far fewer studies have been made of the association behaviour of amphiphiles in apolar solvents, the subject has certainly not been neglected and a large amount of physico-chemical, biological and technological information has been built up. So as to encourage fruitful interactions between researchers from widely varying disciplines with an interest in the latter subject, a Science Foundation Workshop, of which this book is the Proceedings Volume, was held in Rigi-Kaltbad, Switzerland, on 21 September to 2 October 1982. The book contains thirty-one papers and deals with reverse micelles (i.e. 'micelles' formed by amphiphiles in apolar solvents), water-in-oil microemulsions, and other related phenomena.

The first three papers usefully cover general background material. Readers seeking an introduction to the subject should find the historical overview by Stenius particularly useful.

The second section, containing ten papers, covers structure and stability. One would have wished to find here a range of contributions covering the thermodynamics and statistical thermodynamics of association processes in apolar media. The subject does not appear to have reached a stage of development where such contributions are readily forthcoming, however, and only in two papers in this section are thermodynamic aspects of stability touched upon. These are 'The assembly of amphiphiles: molecular and phenomenological models', by Fromherz, and 'Hydrocarbon aromaticity and non-ionic surfactants', by Friberg, Christenson, Bertrand and Larsen. Other problems are approached quantitatively, however, and the reviewer's interest was especially aroused by a paper by Fletcher, Howe, Robinson and Steytler, which attempts to formulate a solution to the problem of concentration and reactivity in reverse micelles and water-in-oil emulsions.

The third section, 'Methodology', contains six papers. Here results obtained by a variety of techniques are presented, including ^{13}C n.m.r., small-angle neutron scattering, fluorescence and electric polarization methods. These papers are all problem-orientated and contain very

little basic introductory material concerning the experimental technique.

The fourth and fifth sections deal, respectively, with 'Biological relevance' and 'Applications'. In an intriguing paper by Montal speculative ideas are put forward on the structure, dynamics and possible functional roles of inverted micelles in biomembranes. It is argued that inverted micelles in biomembranes may be of more significance than previously recognised. A paper by Luisi, Meier, Imre and Pande deals with enzymes and nucleic acids solubilized in hydrocarbon solvents with the help of reverse micelles. It is noted that enzymes hosted in reverse micelles can accept and catalyse not only water-soluble substrates, but also water-insoluble (or sparingly soluble) ones such as steroids or linoleic acid. Separate papers on technological applications by Langevin and Fendler bring out the importance of reverse micelles and water-in-oil emulsions in such fields as oil recovery, lubrication, detergents, general catalysis and artificial photosynthesis.

The reviewer found the book stimulating and can warmly recommend it to research workers wishing to be kept abreast of developments in the field of reverse micelles and related systems.

C. Price
(University of Manchester)

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